

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re U.S. Patent Application of)
)
HIGAKI et al.) **Art Unit 2186**
)
Application Number: 10/803,910)
)
Filed: March 19, 2004)
)
For: MEMORY CONTROL DEVICE AND METHOD)
FOR CONTROLLING THE SAME)
)
Attorney Docket No. ASAM.0115)

**Honorable Assistant Commissioner
for Patents
Washington, D.C. 20231**

PETITION TO MAKE SPECIAL UNDER 37 C.F.R. § 1.102(d)
FOR ACCELERATED EXAMINATION

Sir:

Pursuant to 37 C.F.R. § 1.102(d), Applicants respectively request that the application be examined on the merits in conjunction with the pre-examination search results, the detailed discussion of the relevance of the results and amendments as filed concurrently.

Substantive consideration of the claims is respectfully solicited. Should there be any outstanding issues requiring discussion that would further the prosecution and allowance of the above-captioned application, the Examiner is invited to contact the Applicants' undersigned representative at the address and telephone number indicated below.

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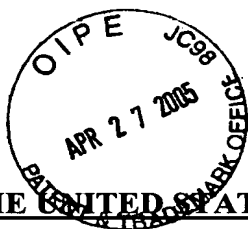
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REED SMITH LLP
3110 Fairview Park Drive, Suite 1400
Falls Church, Virginia 22042
(703) 641-4200
April 27, 2005
SPF/JCM/JT

Respectfully submitted,


Stanley P. Fisher
Registration Number 24,344


Juan Carlos A. Marquez
Registration Number 34,072



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STATEMENTS & PRE-EXAMINATION SEARCH REPORT
SUPPLEMENTAL TO
THE PETITION TO MAKE SPECIAL

Sir:

Pursuant to 37 C.F.R. §§ 1.102 and MPEP 708.02 VIII, Applicants hereby submit that (1) all claims of record are directed to a single invention, or if the Office determines that all the claims presented are not obviously directed to a single invention, will make an election without traverse as a prerequisite to the grant of special status; (2) a pre-examination search has been conducted according to the following field of search; (3) copies of each reference deemed most closely related to the subject matter encompassed by the claims are enclosed; and (4) a detailed discussion of the references pointing out how the claimed subject matter is patentable over the references is also enclosed herewith.

FIELD OF THE SEARCH

The field of search includes the following classes:

<u>Class</u>	<u>Subclasses</u>	<u>Description</u>
360/		DYNAMIC MAGNETIC INFORMATION STORAGE OR RETRIEVAL
	073.03	...Controlling speed of rotary carrier
	074.1	..Stopping or reversing

<u>Class</u>	<u>Subclasses</u>	<u>Description</u> (continued)
369/		DYNAMIC INFORMATION STORAGE OR RETRIEVAL
	030.32For record medium loading or ejecting
	047.44	...Responsive to abnormal condition
710/		ELECTRICAL COMPUTERS AND DIGITAL DATA PROCESSING SYSTEMS: INPUT/OUTPUT
	17	..Availability monitoring
	18	..Activity monitoring

Foreign art was searched using the commercial database Delphion.

The above subclasses represent areas deemed to contain subject matter of interest to one or more of the search features. The integrity of the search is based on the records as presented to us by the United States Patent and Trademark Office (USPTO). Also a key word search was performed on the USPTO full-text database including published U.S. patent applications.

The search was directed towards claims 1-20 of U.S. Application 10/803,910. The claims are characterized by a storage control device comprising: a channel adapter which is connected to an upper device, and provides a first logical volume to the upper device and receives data which are sent from the upper device to the first logical volume, a memory which is connected to the channel adapter and stores the data exchanged between the upper device and the memory, control information with respect to the data exchanged between the upper device and the memory, and configuration information with respect to the configuration of the storage control device, a disk adapter which controls reading and writing the data, which are sent from the upper device to the first logical volume, from and onto the memory as being sent to a second logical volume which maps to the first logical volume and is used as a storing region in transmission and reception of the data between the channel adapter and the disk adapter, an interconnection device which connects to the channel adapter, the memory and the disk adapter, and a plurality of disk drives which are connected to the disk adapter, on which disk drives the data to the second logical volume are written by control of the disk adapter as data group having a redundant relation, and the channel adapter providing logical volumes which controls to the upper device, the logical volume for control being utilized when the configuration information in the memory is read from the upper device, and the channel adapter having a processor which causes other second logical volume instead of the second logical volume to map to the first logical volume in response to a

change-over indication issued from the upper device to the logical volume for control and further causing to operate spindle motors of the plurality of disk drives on which data group mapped to the other second logical volume and having redundant relation is written. (See Conclusion paragraph for detailed references to drawings and specification).

LIST OF RELEVANT REFERENCES

The search revealed the following U.S. and foreign patents, which are listed for convenience:

<u>U.S. Patent No.</u>	<u>Inventor</u>
5,197,055	Hartung et al.
5,701,284	Lee
6,512,652 B1	Nelson et al.

<u>U.S. Patent Application Publication No.</u>	<u>Inventor</u>
2003/0156345	Fayeulle et al.
2005/0018339	Tanner

<u>Foreign Patent No.</u>	<u>Inventor</u>
JP6004979	Satoshi

Discussion of References:

U.S. Patent No. 5,197,055 to **Hartung** et al. was assigned to IBM Corporation and entitled "Idle Demount in an Automated Storage Library". **Hartung** recognizes idle periods for inactive peripheral devices and discontinued use of corresponding data storage media. However, **Hartung** simply does not involve any channel adapter, volume directed mapping, change-over indication, and spindle control (e.g. stopping) based on said mapping and change-over indication. As such, **Hartung** does not provide "a channel adapter which is connected to a upper device, and provides a first logical volume to the upper device and receives data which are sent from the upper device to the first logical volume," "a memory which is connected to the channel adapter and stores the data exchanged between the upper device and the memory, control information with respect to the data exchanged between the

upper device and the memory, and configuration information with respect to the configuration of the storage control device,” “a disk adapter which controls reading and writing the data, which are sent from the upper device to the first logical volume, from and onto the memory as being sent to a second logical volume which maps to the first logical volume and is used as a storing region in transmission and reception of the data between the channel adapter and the disk adapter,” “an interconnection device which connects to the channel adapter, the memory and the disk adapter,” “the channel adapter providing at least one logical volume for control to the upper device, the logical volume for control being utilized when the configuration information in the memory is read from the upper device, and the channel adapter having a processor which causes other second logical volume instead of the second logical volume to map to the first logical volume in response to a change-over indication issued from the upper device to the logical volume for control and further causing to operate spindle motors of the plurality of disk drives on which data group mapped to the other second logical volume and having redundant relation is written” as recited in claims 1 and 11.

U.S. Patent No. 5,701,284 to Lee was assigned to Samsung Electronics Co., Ltd. and entitled “Disk Rotation Control Apparatus and Method”. Lee appears to teach a mode-based stopping and starting of disk rotation in a disk drive (CD). Lee is not directed to HDD or mass storage solutions and does not use content based decisions. Lee simply does not involve any channel adapter, volume directed mapping, change-over indication, and spindle control (e.g. stopping) based on said mapping and change-over indication. As such, Lee does not provide “a channel adapter which is connected to an upper device, and provides a first logical volume to the upper device and receives data which are sent from the upper device to the first logical volume,” “a memory which is connected to the channel adapter and stores the data exchanged between the upper device and the memory, control information with respect to the data exchanged between the upper device and the memory, and configuration information with respect to the configuration of the storage control device,” “a disk adapter which controls reading and writing the data, which are sent from the upper device to the first logical volume, from and onto the memory as being sent to a second logical volume which maps to the first logical volume and is used as a storing region in transmission and reception of the data between the channel adapter and the disk adapter,” “an interconnection device which connects to the channel adapter, the memory and the disk adapter,” “the channel adapter providing at least one logical volume for control to the upper device, the logical volume for control being utilized when the configuration information in the memory is read from the upper device, and

the channel adapter having a processor which causes other second logical volume instead of the second logical volume to map to the first logical volume in response to a change-over indication issued from the upper device to the logical volume for control and further causing to operate spindle motors of the plurality of disk drives on which data group mapped to the other second logical volume and having redundant relation is written” as recited in claims 1 and 11.

U.S. Patent No. 6,512,652 to **Nelson** et al. was assigned to IBM Corporation and entitled “Power Saving Method and Apparatus for Computer Disk Drives”. A microprocessor implements microcode instructions to determine if a disk drive is inactive. If no files are currently opened and/or no data transfers are occurring, the drive is considered inactive and rotational velocity is reduced. However, **Nelson** simply does not involve any channel adapter, volume directed mapping, change-over indication, and spindle control (e.g., stopping) based on said mapping and change-over indication. As such, **Nelson** does not provide “a channel adapter which is connected to a upper device, and provides a first logical volume to the upper device and receives data which are sent from the upper device to the first logical volume,” “a memory which is connected to the channel adapter and stores the data exchanged between the upper device and the memory, control information with respect to the data exchanged between the upper device and the memory, and configuration information with respect to the configuration of the storage control device,” “a disk adapter which controls reading and writing the data, which are sent from the upper device to the first logical volume, from and onto the memory as being sent to a second logical volume which maps to the first logical volume and is used as a storing region in transmission and reception of the data between the channel adapter and the disk adapter,” “an interconnection device which connects to the channel adapter, the memory and the disk adapter,” “the channel adapter providing at least one logical volume for control to the upper device, the logical volume for control being utilized when the configuration information in the memory is read from the upper device, and the channel adapter having a processor which causes other second logical volume instead of the second logical volume to map to the first logical volume in response to a change-over indication issued from the upper device to the logical volume for control and further causing to operate spindle motors of the plurality of disk drives on which data group mapped to the other second logical volume and having redundant relation is written” as recited in claims 1 and 11.

U.S. Patent App. Pub. No. 2003/0156345 of **Fayeulle** et al. is entitled “Data Storage Device and Method for Spindle Power Control”. The patent suggests that R/W activity is monitored by an element 152 and spindle power control is in either a R/W mode or an idle mode. However, **Fayeulle** simply does not involve any mass storage system, channel adapter, volume directed mapping, change-over indication, and spindle control (e.g. stopping) based on said mapping and change-over indication. As such, **Fayeulle** does not provide “a channel adapter which is connected to a upper device, and provides a first logical volume to the upper device and receives data which are sent from the upper device to the first logical volume,” “a memory which is connected to the channel adapter and stores the data exchanged between the upper device and the memory, control information with respect to the data exchanged between the upper device and the memory, and configuration information with respect to the configuration of the storage control device,” “a disk adapter which controls reading and writing the data, which are sent from the upper device to the first logical volume, from and onto the memory as being sent to a second logical volume which maps to the first logical volume and is used as a storing region in transmission and reception of the data between the channel adapter and the disk adapter,” “an interconnection device which connects to the channel adapter, the memory and the disk adapter,” “a plurality of disk drives which are connected to the disk adapter, on which disk drives the data to the second logical volume are written by control of the disk adapter as data group having a redundant relation,” “the channel adapter providing at least one logical volume for control to the upper device, the logical volume for control being utilized when the configuration information in the memory is read from the upper device, and the channel adapter having a processor which causes other second logical volume instead of the second logical volume to map to the first logical volume in response to a change-over indication issued from the upper device to the logical volume for control and further causing to operate spindle motors of the plurality of disk drives on which data group mapped to the other second logical volume and having redundant relation is written” as recited in claims 1 and 11.

U.S. Patent App. Pub. No. 2005/0018339 of **Tanner** (2005/0018339) is entitled “Method and System for Reducing Power Consumption in a Rotatable Media Data Storage Device”. **Tanner**’s power saving method operates at a reduced limit cycle when idle. However, **Tanner** simply does not involve any mass storage system, channel adapter, volume directed mapping, change-over indication, and spindle control (e.g., stopping) based on said mapping and change-over indication. As such, **Tanner** does not provide “a channel adapter

which is connected to a upper device, and provides a first logical volume to the upper device and receives data which are sent from the upper device to the first logical volume,” “a memory which is connected to the channel adapter and stores the data exchanged between the upper device and the memory, control information with respect to the data exchanged between the upper device and the memory, and configuration information with respect to the configuration of the storage control device,” “a disk adapter which controls reading and writing the data, which are sent from the upper device to the first logical volume, from and onto the memory as being sent to a second logical volume which maps to the first logical volume and is used as a storing region in transmission and reception of the data between the channel adapter and the disk adapter,” “an interconnection device which connects to the channel adapter, the memory and the disk adapter,” “a plurality of disk drives which are connected to the disk adapter, on which disk drives the data to the second logical volume are written by control of the disk adapter as data group having a redundant relation,” “the channel adapter providing at least one logical volume for control to the upper device, the logical volume for control being utilized when the configuration information in the memory is read from the upper device, and the channel adapter having a processor which causes other second logical volume instead of the second logical volume to map to the first logical volume in response to a change-over indication issued from the upper device to the logical volume for control and further causing to operate spindle motors of the plurality of disk drives on which data group mapped to the other second logical volume and having redundant relation is written” as recited in claims 1 and 11.

JP 6004979 to **Satoshi** was assigned to Ricoh Co., Ltd. and entitled “Control Method for Driving with Power Saving Disk Storage Device of Data Apparatus Driven by Battery”. **Satoshi** reduces power by slowing or stopping a spindle motor during non R/W cycles and low power levels. However, **Satoshi** simply does not involve any mass storage system, channel adapter, volume directed mapping, change-over indication, and spindle control (e.g. ,stopping) based on said mapping and change-over indication. As such, **Satoshi** does not provide “a channel adapter which is connected to a upper device, and provides a first logical volume to the upper device and receives data which are sent from the upper device to the first logical volume,” “a memory which is connected to the channel adapter and stores the data exchanged between the upper device and the memory, control information with respect to the data exchanged between the upper device and the memory, and configuration information with respect to the configuration of the storage control device,” “a disk adapter which controls

reading and writing the data, which are sent from the upper device to the first logical volume, from and onto the memory as being sent to a second logical volume which maps to the first logical volume and is used as a storing region in transmission and reception of the data between the channel adapter and the disk adapter,” “an interconnection device which connects to the channel adapter, the memory and the disk adapter,” “a plurality of disk drives which are connected to the disk adapter, on which disk drives the data to the second logical volume are written by control of the disk adapter as data group having a redundant relation,” “the channel adapter providing at least one logical volume for control to the upper device, the logical volume for control being utilized when the configuration information in the memory is read from the upper device, and the channel adapter having a processor which causes other second logical volume instead of the second logical volume to map to the first logical volume in response to a change-over indication issued from the upper device to the logical volume for control and further causing to operate spindle motors of the plurality of disk drives on which data group mapped to the other second logical volume and having redundant relation is written” as recited in claims 1 and 11.

Conclusion

Based on the results of the comprehensive prior art search as discussed above, Applicants contend that the storage control device as now recited in independent claims 1 and 11, especially the feature of “the channel adapter providing at least one logical volume for control to the upper device, the logical volume for control being utilized when the configuration information in the memory is read from the upper device, and the channel adapter having a processor which causes other second logical volume instead of the second logical volume to map to the first logical volume in response to a change-over indication issued from the upper device to the logical volume for control and further causing to operate spindle motors of the plurality of disk drives on which data group mapped to the other second logical volume and having redundant relation is written” is patentably distinct from the cited prior art references.

In particular, as now recited in the claim 1 (for example, the embodiment shown in Figs. 1-3), the storage control device 1-1 of the invention comprises: a channel adapter 1-3 which is connected to a upper device 1-2, and provides a first logical volume 2-15 or 2-16 (Fig. 2) to the upper device and receives data which are sent from the upper device 1-2 to the first logical volume e.g., 2-15, a memory 1-10 which is connected to the channel adapter 1-3

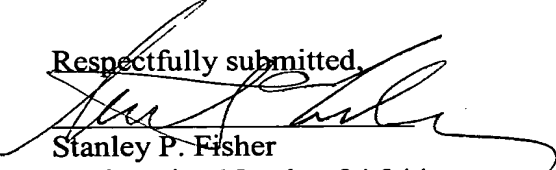
and stores the data exchanged between the upper device 1-2 and the memory 1-10, control information with respect to the data exchanged between the upper device 1-2 and the memory 1-10, and configuration information 3-17 (Fig. 3) with respect to the configuration of the storage control device 1-1, a disk adapter 1-7 which controls reading and writing the data, which are sent from the upper device 1-2 to the first logical volume 1-15, from and onto the memory 1-10 as being sent to a second logical volume 2-13 or 2-14 (Fig. 2; *“The host logical volume 2-15 maps to the internal logical volume 2-13 having an actual memory region for memorizing data.... The data written from the host computer onto the host logical volume are written onto the internal logical volume having the actual memory region according to the mapping between the host logical volume and the internal logical volume.”* p. 14, line 27 to p. 15, line 24) which maps to the first logical volume 2-15 or 2-16 (*“imaginary ones not having actual memory regions”* p. 14, lines 19-27) and is used as a storing region in transmission and reception of the data between the channel adapter 1-3 and the disk adapter 1-7, an interconnection device 1-9 which connects to the channel adapter 1-3, the memory 1-10 and the disk adapter 1-7, and a plurality of disk drives 1-6 which are connected to the disk adapter 1-7, on which disk drives 1-6 the data to the second logical volume are written by control of the disk adapter 1-7 as data group having a redundant relation. The channel adapter 1-3 provides at least one logical volume for control 3-11 (Fig. 3; p. 16, lines 10-22; *“This host logical volume (for control) 3-11 does not store the data of the application program but is used to control the storage control device 3-1. The term “control” is here understood as signifying the function for reading out the configuration information 3-17 and the function for changing the mapping between the host logical volume and the internal logical volume.”* P. 20, 1st paragraph) to the upper device 1-2, the logical volume for control 3-11 being utilized when the configuration information 3-17 in the memory 1-10 is read from the upper device 1-2, and the channel adapter 1-3 having a processor 1-12 which causes other second logical volume instead of the second logical volume to map to the first logical volume 2-15 in response to a change-over (p. 24, lines 3-18; p. 27, lines 4-19; *“the configuration of the host logical volume and the mapping of the internal logical volume are modified without varying the configuration of the host logical volume recognized by the host computer at all”* p. 31, line 24 to p. 32, line 13) indication issued from the upper device 1-2 to the logical volume for control 3-11 and further causing to operate spindle motors of the plurality of disk drives 1-6 on which data group mapped to the other second logical volume and having redundant relation is written.

The invention recited in claim 11 is directed to a method for controlling the storage control device 1-1 recited in claim 1.

In view of all the above, clear and distinct differences as discussed exist between the present invention as now claimed and the prior art references, Applicants respectfully contend that the prior art references cannot anticipate the present invention or render the present invention obvious. Rather, the present invention as a whole is distinguishable, and thereby allowable over the prior art.

Favorable consideration of this application is respectfully solicited. Should there be any outstanding issues requiring discussion that would further the prosecution and allowance of the above-captioned application, the Examiner is invited to contact the Applicants' undersigned representative at the address and phone number indicated below.

Respectfully submitted,



Stanley P. Fisher
Registration Number 24,344

Juan Carlos A. Marquez
Registration Number 34,072

REED SMITH LLP
3110 Fairview Park Drive
Suite 1400
Falls Church, Virginia 22042
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